(12) UK Patent Application (19) GB (11) 2 131 383 A

(21) Application No 8332017
(22) Date of filing 30 Nov 1983
(30) Priority data
(31) 24517
(32) 30 Nov 1982
(33) Italy (IT)
(43) Application published
20 Jun 1984
(51) INT CL³
B65B 35/00 21/00
(52) Domestic classification
B8C U21
U1S 1808 1809 1878 B8C
(56) Documents cited
GB 1321142
GB 1014767
(58) Field of search
B8C
B8A
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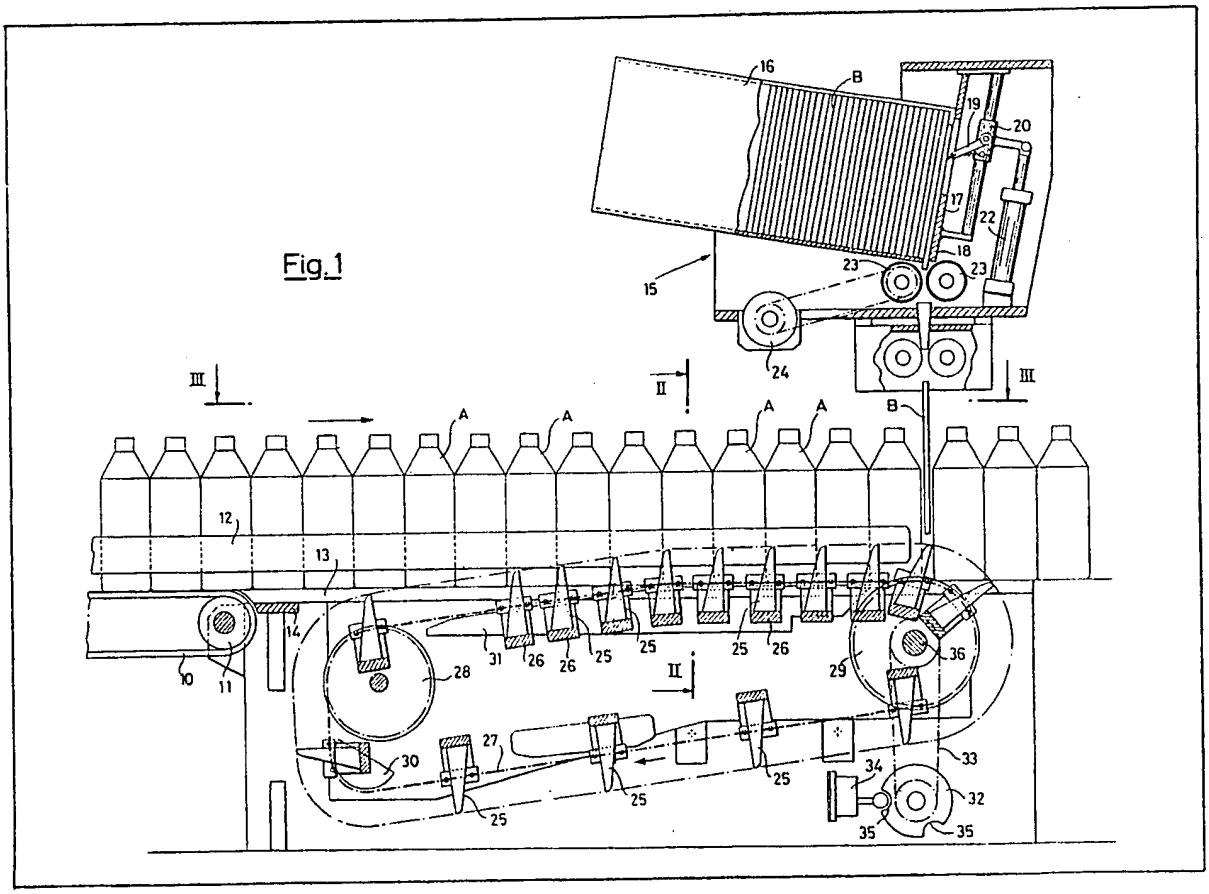
# (54) Device for automatically inserting transverse elements between containers which advance side-by-side in at least one row

(57) In order to allow the automatic insertion of transverse divider elements between containers, such as bottles, cans and the like, which advance side-by-side in at least one row, a device is proposed which comprises above the moving containers an automatic divider element distributor 15 and below the containers means for temporarily spacing the containers apart to create the space necessary for inserting the divider elements. These means are constituted by a series of pegs 25 which are made to move, at the same linear speed as the containers, along an endless path comprising a branch, part of which slopes upwards during which the pegs are inserted between the containers, and part of which is parallel to the container advancement direction, during which the pegs accompany the containers, said branch being connected to a return branch by way of a substantially semi-circular portion lying directly below the distributor 15 and in which the tips of the pegs space the containers apart because of the difference between the path taken by the tips of the pegs and the path taken by their base.

Fig.1




The drawings originally filed were informal and the print here reproduced is taken from a later filed formal copy.

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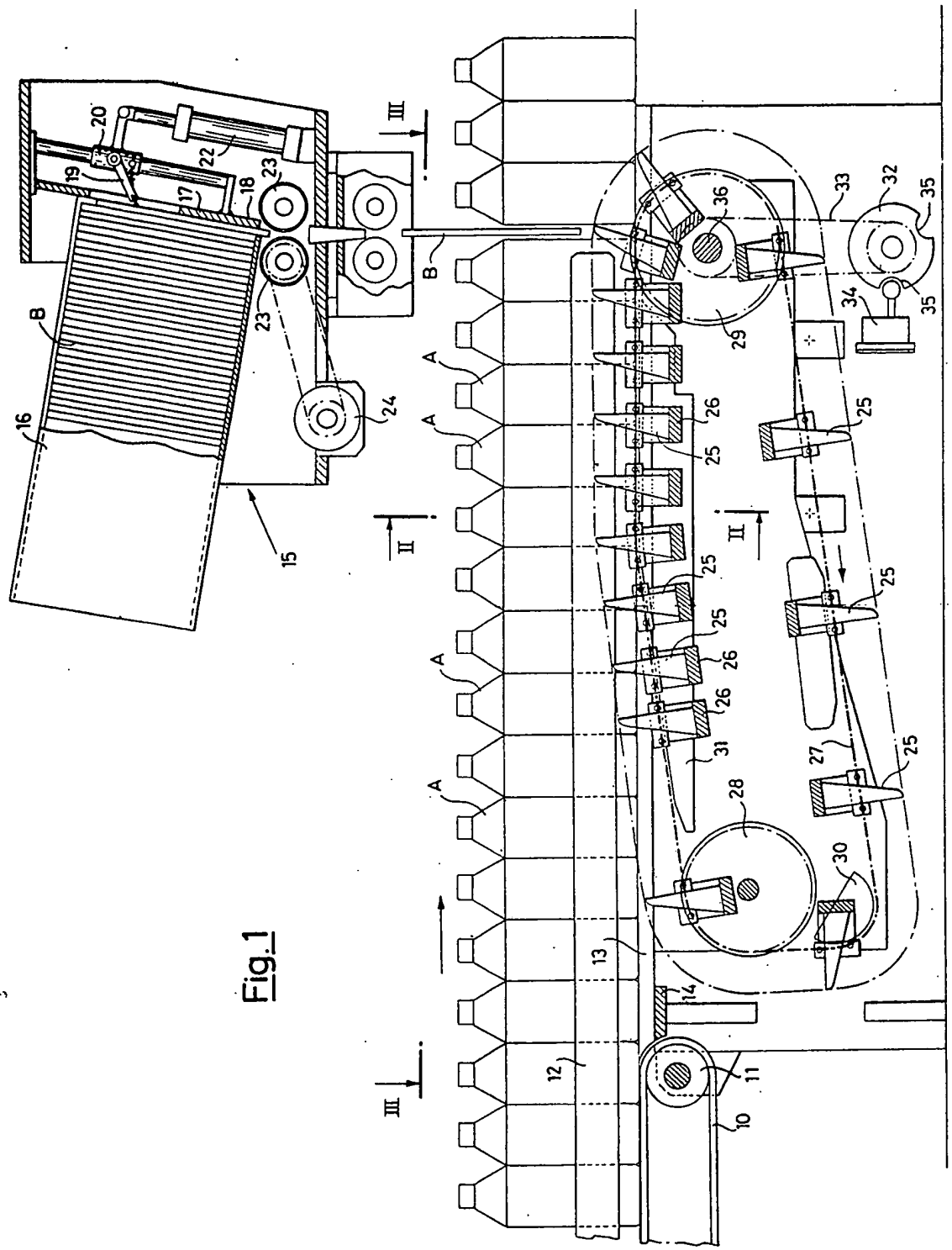


Fig.1

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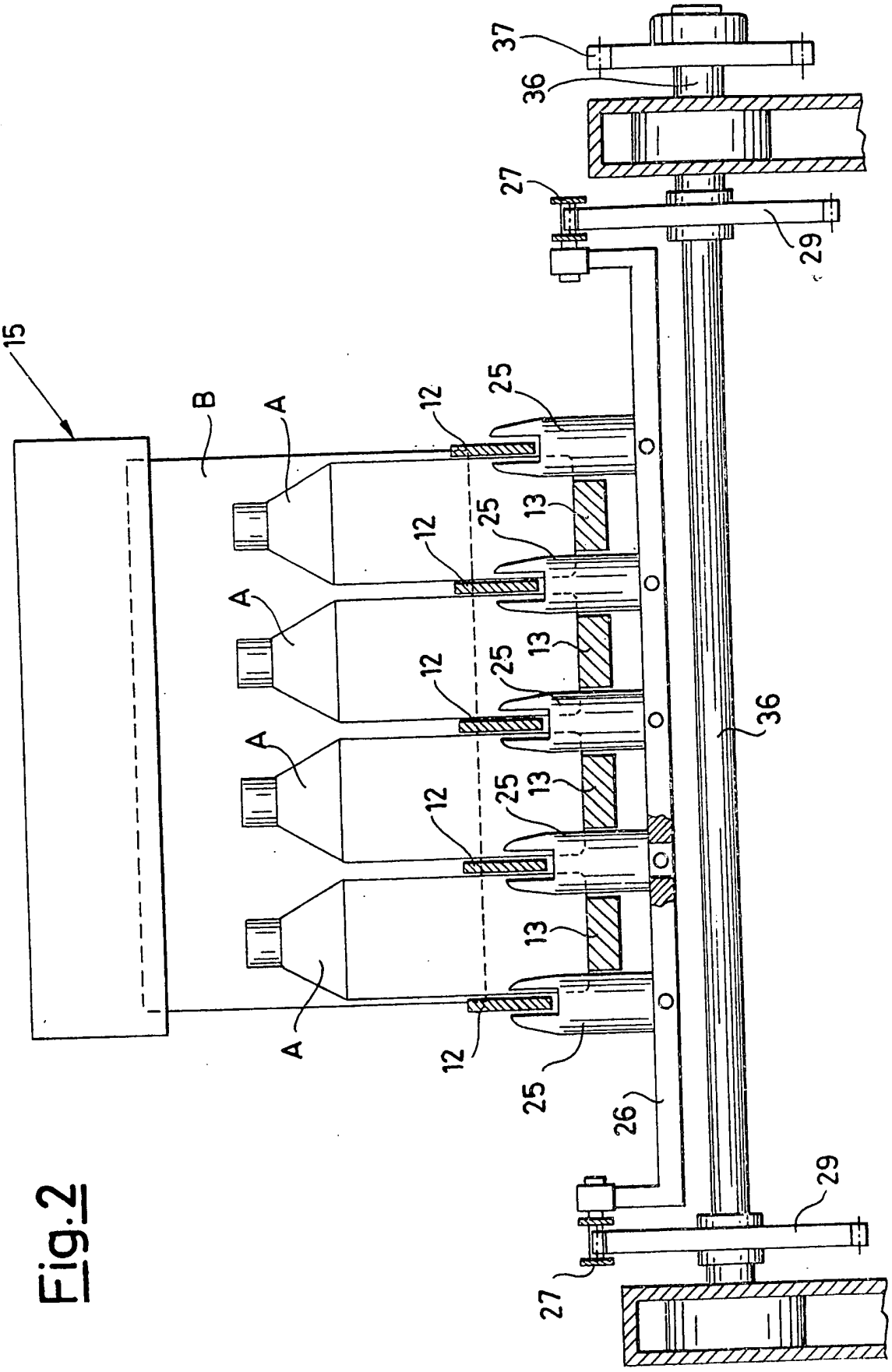


Fig.2

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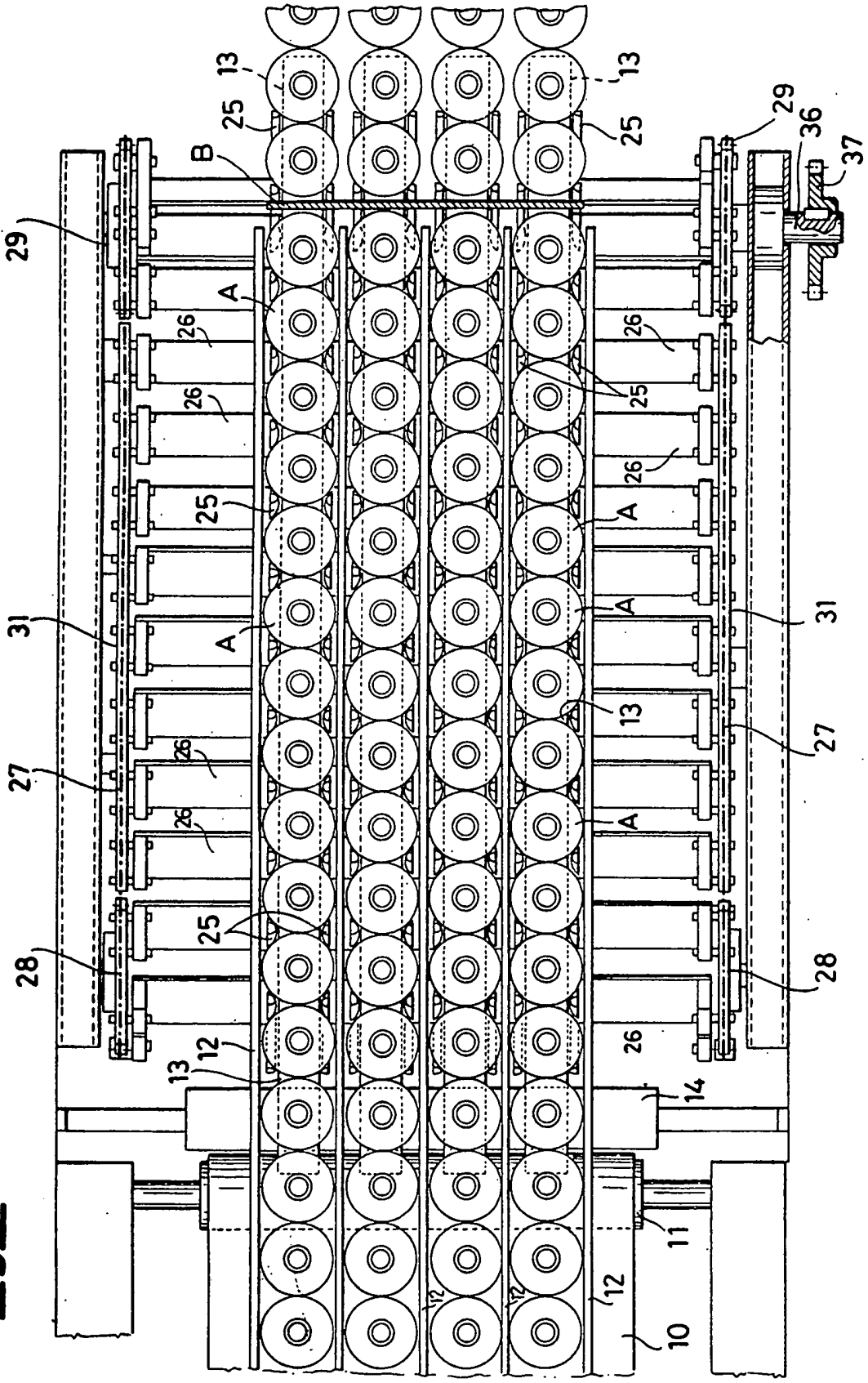


Fig.3

SPECIFICATION

# Device for automatically inserting transv rse elements between containers which advance side-by-side in at least one row

This invention relates to a device for automatically inserting transverse divider elements between containers which advance side-by-side in at least one row.

This device is intended particularly for insertion into a line for automatically packaging groups of said containers, such as bottles, cans or the like, into cartons, which line can directly follow a plant for filling and closing said containers.

In many cases it is a well known requirement to insert longitudinal and transverse divider elements between the individual containers of each group which is to be packaged into one carton, in order to suitably separate and protect the containers, especially if they are fragile.

This insertion of the divider elements must be synchronised with the production rate of the container filling and closing plant and with that of the packaging line, and must be carried out with maximum precision in order to ensure high productivity and prevent undesirable production interruptions.

The insertion of the longitudinal divider elements between containers advancing in parallel rows creates no particular problem, in that it is necessary only to temporarily space-apart the container advancement channels. The insertion of the transverse divider elements between containers which advance side-by-side is however more complicated.

In a known device for effecting this latter operation, the containers advancing in parallel rows are previously divided into groups, each group of containers is fed at a certain constant speed spaced-apart from the next group, and the individual lines of containers of each group are temporarily accelerated beyond said constant feed speed in order to cause each line of containers to become spaced-apart from the next, thus enabling the transverse divider elements to be inserted. Said acceleration is attained by means of a motorised accelerator belt operating within a thrust bar conveyor which causes the groups of containers to advance along a slide track at a suitable distance apart. This known device, the operation of which is based on the sudden acceleration of the containers, can lead to drawbacks and inaccuracies, especially at high production rates.

In another known device, preformed groups of containers are fed spaced-apart along a slide track within a thrust bar conveyor, said slide track comprising a depression such as to cause each line of conveyors to incline and thus open relative to the next, so as to enable the transverse divider elements to be inserted. This known device also involves uncertainties and drawbacks, and does not allow high production rates to be attained.

A further known device comprises a belt conveyor for each row of spaced-apart containers, together with braking means associated with these belt conveyors, which operate at a speed less than the advancement speed of the belt conveyors and are temporarily inserted between the successive containers of each row. In this case, the containers become spaced-apart to allow insertion of the dividers by braking in each row the spaced-apart containers upstream of said braking means and releasing one container at a time downstream of said braking means. This device not only has the drawback of retaining all the row containers upstream of the braking means in a braked condition and thus slipping on the conveyors, but also the drawback of not providing for bringing the containers together again immediately downstream of the point of insertion of the transverse dividers. The object of the present invention is therefore to provide a device for automatically inserting transverse divider elements between containers which continuously advance side-by-side, which device obviates the drawbacks of the known art by ensuring greater precision in the insertion of said dividers and allowing a higher production rate to be attained.

This object is attained by the device according to the invention, which comprises above the moving containers an automatic divider distributor and below the containers means for temporarily spacing the containers apart, and is characterised in that said means are constituted by a series of pegs which are made to move, at the same linear speed as the containers, along an endless path comprising a branch, part of which slopes upwards, during which the pegs are inserted between the containers, and part of which is parallel to the container advancement direction, during which the pegs accompany the containers, said branch being connected to a return branch by way of a substantially semi-circular portion disposed directly below said divider distributor, and in which the tips of the pegs follow a path which is longer than that of their base.

Advantageously, said pegs are supported by transverse bars connected at their ends to two endless chains which move in parallel vertical planes and thus cause said bars with their pegs to follow the predetermined path. The distance between said bars is such that one peg can be inserted in the longitudinal direction between each pair of containers advancing in a row. The number of pegs carried by each bar is such that two pegs act in the transverse direction on each container. In the case of a plurality of parallel rows of containers, the intermediate pegs carried by each transverse bar act simultaneously on the containers pertaining to two adjacent rows in the same line.

Further characteristics and advantages of the invention will be more apparent from the detailed description of one embodiment of the device given hereinafter with reference to the accompanying drawings, in which:

Figure 1 shows the device in elevation in the form of a partly sectional side view;

Figure 2 is a cross-section on the line II—II of

Figure 1; and

Figure 3 is a plan view on the line III—III of Figure 1.

The device shown in the drawings is designed for a line which packages into cartons bottles indicated by A advancing in four parallel rows, the bottles of each row being in side-by-side relationship and the bottles of the various rows forming transverse lines perpendicular to the advancement direction.

The four rows of bottles A are fed, at constant speed of advancement, by a conveyor belt 10, of which Figures 1 and 3 show the end with its deviation roller 11. Divider and side walls 12 disposed in a longitudinal direction define the individual parallel channels for the advancement of the rows of bottles.

From the motorised conveyor belt 10, the rows of bottles A arrive on to slide surfaces 13 which are supported in a stationary manner by supports 14 of the frame. Said slide surfaces 13 form the base of the advancement channels for the rows of bottles. Above the parallel advancement channels of the bottles A there is disposed an automatic distributor of transverse divider elements, which is indicated overall by 15 in Figure 1. This distributor comprises a store 16 for stacked divider elements B, which is closed at its front and comprises in its base in the vicinity of the front wall 17 a slot 18 having a width such as to allow a single divider element B to emerge downwards at a time.

Spring-loaded pointed fingers 19 can act on the front divider element through an aperture provided in the front wall 17 of the store 16, and are carried by a slide 20 which can be moved along a rod 21 by a pneumatic cylinder 22 or the like, in order to expel the first divider element B from the store 16 through its base slot 18. A pair of rollers 23, of which at least one is driven by a motor 24, can grip the divider element expelled by the store 16 in order to propel it downwards through suitable guide members into the space formed between successive lines of bottles A which advance in the parallel channels, as clearly visible in Figure 1.

In order to temporarily create this space between successive lines of bottles which advance side-by-side and thus allow the introduction of the transverse divider elements B, the invention provides the means described hereinafter.

These means are constituted essentially by pegs 25, which are intended for insertion into the spaces existing between the side-by-side bottles advancing in parallel rows, in order, at a certain point, to space a line of bottles from the next line so as to create the space necessary for inserting a divider element B between the two lines of bottles A.

The pegs 25 are supported by transverse bars 26, of which each carries a number of pegs 25 equal to the number of rows of bottles plus one. In this respect, as clearly shown in Figures 2 and 3, two pegs 25 are intended to act on each bottle A, and those pegs carried by any one bar 26 which are intermediate between the end ones act simultaneously on two bottles in the respective line which pertain to adjacent rows of bottles.

It should be noted that the pegs 25 act on the sides of the bottles A, and their tip is configured as two prongs (see Figure 2 in particular) in that not to interfere with the divider and side walls 12.

The bars 26 carrying the pegs 25 are connected at each end to a chain 27, the two chains being disposed in parallel vertical planes and each guided through an endless path over deviation sprockets 28 and drive sprockets 29 and by way of suitable stationary guide elements, such as 30 and 31. It should be noted that each bar 26 is connected at each end to two consecutive pins of the relative chain 27, so that in the upper branch of the path the pegs 25 carried by the bars 26 point upwards, whereas in the lower return branch they point downwards.

The drive sprockets 29 are mounted on a common shaft 36 supported by the frame, said shaft also carrying a sprocket 37 for a drive chain (not shown in Figure 3) which moves the chains 27 with their bars 26 and pegs 25 at a linear speed equal to the speed of advancement of the bottles A along the slide surfaces 13 as determined by the belt conveyor 10.

The deviation sprocket 28 and drive sprocket 29 and the guides 30, 31 for the chains 27 are disposed in such a manner (see Figure 1) as to determine an endless path for said chains and thus for the bars 26 carrying the pegs 25. The upper branch of this path partly slopes upwards and is partly parallel to the direction of advancement of the bottles A (see arrows in Figure 1). As the individual pegs 25 move along the upwardly sloping part, they become progressively inserted by their forked tips into the spaces left free between the bottles A which advance side-by-side in parallel rows, whereas in the second part of the upper branch, parallel to the direction of advancement of the bottles, the pegs 25 simply accompany said bottles and travel at the same linear speed as these latter. The upper branch of the path is connected to the lower return branch by a substantially semi-circular portion determined by the passage of the chains 27 around the drive sprockets 29.

In this semi-circular portion it is apparent that the tip of the pegs 25 has to follow a longer path than that followed by the base of said pegs, and this path difference causes the line of bottles preceding the considered pegs to become spaced-apart in this zone from the immediately following line. It should be noted that this spacing is obtained without sudden acceleration of the bottles, but instead only under the thrust of the pegs acting on the sides of said bottles. The zone in which two consecutive lines of bottles thus become temporarily spaced-apart lies directly below the point at which the transverse divider elements B are discharged from the automatic distributor 15. Downstream of this zone, the lines of bottles are again brought side-by-side, but by way of the transverse divider elements, to be then fed to the other carton packaging operations.

The bottles are packaged in groups each comprising a certain number of rows and lines of bottles. In the case illustrated, there are four rows, and in this case the bottles can be grouped for example into twelve per carton, so that three lines must be provided in each group. The divider elements B are obviously inserted between the bottles of the same group, whereas dividers are not inserted between the bottles of successive groups. This means that in the example considered two consecutive transverse divider elements have to be inserted between a first and a second and between the second and a third line of bottles respectively, whereas no divider is inserted between the third and a fourth line of bottles, this latter constituting the first line of the next group to be packaged. This is done by suitably controlling the automatic distributor 15 for the divider elements B. For this purpose, a cam 32 (Figure 1) can be provided, operated synchronously with the movement of the chains 27 and thus of the pegs 25, for example by means of a transmission 33 between the shaft 36 carrying the drive sprockets 29 and the shaft for the cam 32, with this latter there cooperating a micro-switch 34 arranged to control the pneumatic cylinder 22 of the automatic distributor 15. In the case considered, the periphery of the cam 32 comprises three angularly equidistant positions, two of which are provided with a cavity 35, whereas the third does not contain a cavity. When during rotation of the cam 32 one or other of the two cavities 35 is in a position corresponding with the micro-switch 34, this latter causes the expulsion of a transverse divider element B from the automatic distributor store 16.

The advantages of the device according to the invention are apparent from the aforegoing description. They consist mainly of the fact that the necessary spacing of the containers in order to create the space for inserting the transverse dividers is obtained under the controlled thrust of pegs previously inserted between the containers and advancing at the same speed as these latter, so that high precision is ensured in this operation, thus allowing a high production rate without danger of disturbance or interruption in the production process.

CLAIMS

1. A device for automatically inserting transverse divider elements between containers which advance side-by-side in at least one row, comprising above the moving containers an automatic distributor for the divider elements and below the containers means for temporarily spacing the containers apart, characterised in that said means are constituted by a series of pegs, and drive and guide means are provided in order to cause said pegs to move at the same linear speed as the containers along an endless path comprising a branch, part of which slopes upwards, during which the pegs are inserted between the containers, and part of which is parallel to the container advancement direction, during which the pegs accompany the containers, said branch being connected to a return branch by way of a substantially semi-circular portion disposed directly below said divider distributor, and in which the tip of the pegs follows a path which is longer than that of their base.

2. A device as claimed in claim 1, characterised in that said pegs are supported by transverse bars connected at their ends to two endless chains which move in parallel vertical planes and thus cause said bars with their pegs to follow the predetermined path.

3. A device as claimed in claim 2, characterised in that said peg support bars are connected to the pair of chains at such distances apart that one peg becomes inserted in the longitudinal direction between each pair of containers advancing in a row.

4. A device as claimed in claim 3, characterised in that the number of pegs carried by each bar is such that two pegs act in the transverse direction on each container advancing in a row.

5. A device as claimed in claim 4, characterised in that the intermediate pegs of each bar act simultaneously on the containers pertaining to two adjacent rows of containers.

6. A device as claimed in claim 1, characterised in that means synchronised with the peg movement are provided for controlling the automatic divider element distributor.

7. A device for automatically inserting transverse divider elements between containers which advance side-by-side in at least one row, substantially as hereinbefore described with reference to the accompanying drawings.

Printed for Her Majesty's Stationery Office by the Courier Press, Leamington Spa, 1984. Published by the Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained.